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Prunus Laurocerasus, *Hedera Helix*, *Ardisia crispa*, and all needle bearing trees and shrubs. When injured by smoke the homobaric leaves show the injury to the whole leaf due to the gases distributing themselves throughout the whole intercellular system, while the heterobaric leaves show the injury in spots corresponding to individual intercellular chambers.—WM. CROCKER.

Nitrogen fixation by Azotobacter.—HUTCHINSON,[12] in agreement with KOCH, REMY, and others, finds that the nitrogen content of sand or soil may be increased appreciably by the activity of *Azotobacter* when some suitable source of energy is supplied. Sugars proved very effective as an energy source, and distinct gains were obtained with plant residues. In pot cultures the nitrogen gains ran as high as 9 mg. of nitrogen per gram of plant residue added. Even in field cultures additions of sugar increased crop yields 20–54 per cent when conditions were favorable. HUTCHINSON believes the carbohydrates of plant residues act in a similar way in furthering nitrogen fixation and crop yields. For successful operation of this organism suitable temperature, the presence of phosphates, and a supply of basic material such as calcium carbonate are necessary. Besides these factors, some unknown conditions appear periodically in the soil, interfering with the action of this organism.

The effect of the addition of straw or other crop residues to the soil may be very complex. As important among these effects may be mentioned modification of physical condition of the soil, direct addition of nutrients (in the case of straw, considerable potash, little nitrogen as well as other nutrients), and the indirect addition of nitrogen through furnishing an energy source for *Azotobacter*.—WM. CROCKER.

Fucosan vacuoles.—HANSTEEN noted that granules, as he called them, accumulate about the chromatophores of Phaeophyceae during carbon assimilation. He thought they were produced by the chromoplasts and were the first visible product of carbon assimilation. On this basis he called them fucosan granules. KYLIN[13] has made a rather extensive study of these bodies, the results of which are summarized in the article here reviewed. He finds that these bodies are vacuoles rather than granules, and while they are probably formed by the chromoplast in connection with carbon assimilation, they are not made up in the main of carbon synthate. He thinks he has shown that dextrose is the first carbon synthate of the Phaeophyceae, and that this is condensed to lamanarin. These vacuoles may be the means by which the synthate leaves the plastid, but it is not stored in them. On the contrary, it rapidly diffuses from them into the cytoplasm. He thinks these vacuoles, especially the older ones, are filled with substances resembling tannin, but differing from true tannin in some respects. He considers these tannin-like substances as meaningless waste products, which upon oxidation give rise to the brown pigment of this group of plants (phycophaein), which was formerly considered a pigment of the chromatophore.—WM. CROCKER.

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[12] HUTCHINSON, H. B., The influence of plant residues on nitrogen fixation and on losses of nitrate in the soil. Jour. Agric. Sci. **9**:92–111. 1918.

[13] KYLIN, HERALD, Über die Fucosanblasen der Phaeophyceen. Ber. Deutsch. Bot. Gesells. **36**:10–19. 1918.

Apogamy in Nephrodium.—STEIL[14] has uncovered an interesting situation in *Nephrodium hirtipes*, in that the gametophyte never produces archegonia, although antheridia with normal sperms are developed. Secondary gametophytes were induced readily, but only rarely was apospory induced. The embryo begins to develop early in the history of the gametophyte as a vegetative outgrowth, the apical cells of leaf, root, and stem appearing successively, but no foot is formed. No migrations or fusions of nuclei were observed in connection with embryo development. The diploid number of chromosomes is 120–130, and the haploid number (60–65) was observed both in the gametophyte and the apogamous sporophyte. Suggestions are offered as to the origin of such persistent apogamy, the most interesting one being that *N. hirtipes* and other apogamous ferns may be of hybrid origin. The paper is introduced by a very useful summary of our knowledge of apogamy in ferns, beginning with the discovery of tracheids in the gametophyte of *Pteris sulcata* by LESZCYC-SUMINSKI in 1848. The first clear recognition of an apogamous embryo, however, as distinguished from one resulting from fertilization, is credited to FARLOW, who in 1874 discovered apogamy in *Pteris cretica albo-lineata*.—J. M. C.

Soil acidity.—HARTWELL and PEMBER[15] find that rye does well on acid soils, while barley is much injured by them. Aqueous extract of acid soil, residue from distillate of the aqueous extract, and the ash of the residue from such distillate affect the two plants much as does the soil itself. Soluble aluminum salts and not the acid in the soils proved to be the source of injury to the barley plants. Addition of acid phosphates, which renders the soil more acid, and lime reduced the solubility of the aluminum salts in acid soils and rendered them non-toxic to barley plants. The authors think these substances often produce beneficial effects in this way rather than by furnishing more available phosphorus or by neutralizing the acid. The reviewer has noticed that the hydrogen ion concentration found in acid soils by the gas chain method is generally only a fraction of the hydrogen ion concentration necessary to reduce the growth rate of plants in water or sand cultures. This work again suggests the complexity of the apparently simple problem of soil acidity.—WM. CROCKER.

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[14] STEIL, W. N., A study of apogamy in *Nephrodium hirtipes*. Ann. Botany **33**: 109–132. *pls. 5–7*. 1919.

[15] HARTWELL, B. L., and PEMBER, F. R., The presence of aluminum as a reason for the difference in the effect of the so-called acid soil on barley and rye. Soil Science **6**:259–279. 1918.